



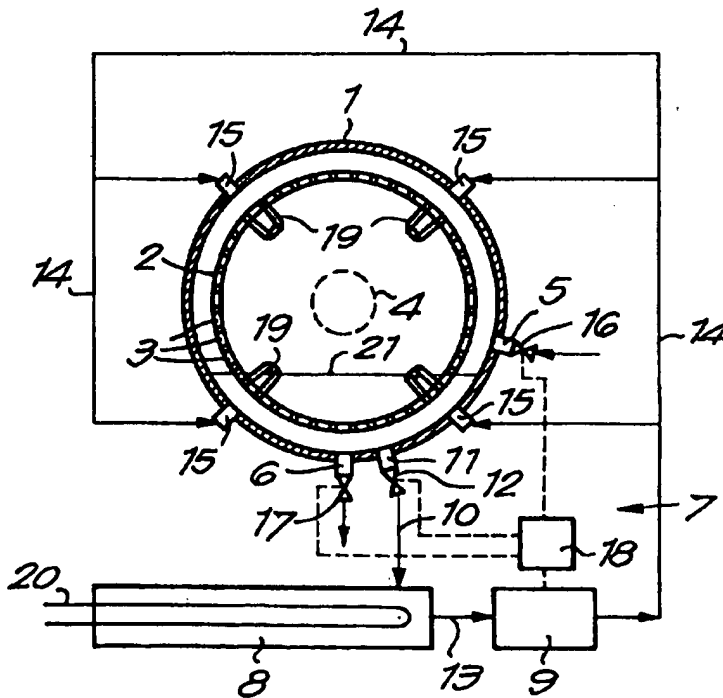
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : D06F 35/00, 39/08</p>	<p>A1</p>	<p>(11) International Publication Number: WO 97/15709 (43) International Publication Date: 1 May 1997 (01.05.97)</p>
<p>(21) International Application Number: PCT/BE96/00110 (22) International Filing Date: 18 October 1996 (18.10.96) (30) Priority Data: 9500875 20 October 1995 (20.10.95) BE (71)(72) Applicant and Inventor: PEETERS, Tom, Walter, Helena, Maria, Peter [BE/BE]; Ferdinand Pauwelsstraat 45, B-2180 Ekeren (BE). (74) Agent: DONNE, Eddy; Bureau M.F.J. Bockstael N.V., Arenbergstraat 13, B-2000 Antwerpen (BE).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report. In English translation (filed in Dutch).</i></p>	

(54) Title: WASHING MACHINE

(57) Abstract

Washing machine containing a fixed outer drum (1), an inner drum (2) mounted therein in a rotatable manner and provided with openings (3), which is provided with ribs (19) on the inside, means (4) to rotate the inner drum (2), a water inlet (5) which opens in the outer drum (1), and a water outlet (6) which is connected to the bottom side of the outer drum (1), characterized in that it contains means (7) to inject water under high pressure in the inner drum (2).



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgystan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LI	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

Washing machine.

5

The present invention concerns a washing machine with a fixed outer drum, an inner drum mounted therein in a rotatable manner and provided with openings, which is provided with ribs on the inside, means to rotate the inner drum, a water inlet which opens into the outer drum and a water outlet which is connected to the bottom side of the outer drum.

During the washing, the outer drum is filled with water up to a certain level. This water is supplied more or less warm or it is heated in the outer drum, for example by means of steam injection, and washing product is added to this water.

As a result of the rotation of the inner drum, the laundry is taken out of the water by the ribs, after which it falls back into the water again.

A good washing result is obtained by combining this mechanical action, the temperature of the water, the amount of washing product and the time. These four factors are related to one another, which implies that one of these factors can be reduced when another one is increased.

30

Raising the temperature of the water or increasing the amount of washing product is not economical, since washing products and high temperatures represent the major part of the costs when washing nowadays.

Increasing the washing time is nor very practical, nor economical.

That is why some have tried to increase the mechanical
5 action by optimizing the position and dimensions of the
ribs on the inner drum.

The thus obtained improvement of the washing result is
restricted, however.

10

Also, the invention aims to remedy the above-mentioned
disadvantages and to provide a washing machine with which
can be obtained a better washing result in an economical
manner.

15

This aim is reached according to the invention in that
the washing machine contains means to inject water under
high pressure in the inner drum.

20 Thanks to the injection under high pressure, the
mechanical action is considerably increased in a cheap
manner.

Preferably, the above-mentioned means also contain means
25 to evacuate water from the outer drum while water is
being injected under high pressure, in practically
corresponding amounts.

In this case, the means to inject water under high
30 pressure may contain a closed circuit in which is mounted
a high-pressure pump to put the water under high
pressure.

This water under high pressure may be inserted via one or

several nozzles, for example sprinkler nozzles. These nozzles may be provided on the outer drum, but they are preferably situated in the loading door, the backside of the inner drum or the ribs on the inner drum.

5

In the latter two cases, the water under pressure is supplied via a rotating connection and through a duct in the shaft with which the inner drum is mounted in a rotating manner in the outer drum.

10

In order to better explain the characteristics of the invention, the following preferred embodiments of a washing machine according to the invention are described, as an example only without being limitative in any way, with reference to the accompanying drawings, where:

figure 1 schematically represents a cross section of a washing machine according to the invention;

20

figures 2, 3 and 4 are schematic, axial sections of a part of a washing machine, but with reference to a second, a third and a fourth embodiment of the invention respectively.

25

The washing machine as represented in figure 1 contains a fixed outer drum 1 which is erected with its shaft in a horizontal position, a co-axial inner drum 2 situated in the latter in a rotatable manner which is provided with openings 3, means, consisting of a motor 4 and/or a transmission, to drive the inner drum 2, a water inlet 5 which opens into the inside of the outer drum 1, a water outlet 6 which is connected to the bottom side of the outer drum 1 and means 7 to inject water under high pressure in the inner drum 2.

30

These means 7 consist of a closed circuit in which are mounted a reservoir 8 and a high-pressure pump 9.

The reservoir 8 is connected with the conduit 10 to an outlet 11 which is connected to the bottom side of the outer drum 1 and onto which is mounted a valve 12. This reservoir 8 is connected to the high-pressure pump 9 by means of a conduit 13.

10 The outlet of the high-pressure pump 9, which supplies a pressure of more than 8 bar, for example 100 bar, and a delivery of for example 10 litres per min., is connected via conduits 14 to four nozzles 15, consisting for example of sprinkler nozzles, which are mounted evenly distributed over the circumference in the fixed outer drum 1.

Also on the water inlet 5 and the water outlet 6 are mounted valves 16 and 17 respectively.

20

The valves 12, 16 and 17 are electrically controlled valves which are controlled together with the high-pressure pump 9 and the motor 4 by a control unit 18.

25 On the inside of the inner drum are provided ribs or blades 19.

In the reservoir 8 are provided heating means consisting of resistors 20, which can heat up the water to about 90 degrees C.

30

The washing machine works as follows:

After the washing machine has been filled with laundry,

5

the control unit 18 orders the valve 16 to open while the other valves are closed, such until the required level 21 is reached, for example such that a fourth of the inner drum 2 is filled with water.

5

This level can be determined for example by means of a float indicator, not represented in figure 1, which sends a signal to the control unit 18 as soon as the level is reached, after which this control unit 18 orders the valve 16 to close.

10

In a known manner, the required washing products are put in the water, after which the control unit 18 orders the motor 4 to start, which sets the inner drum 2 in motion.

This inner drum 2 can be rotated continuously or intermittently, possibly alternately in one or the other direction.

15

Immediately thereafter, the control unit 18 activates the high-pressure pump 9 and it simultaneously orders the valve 12 to open, such that this valve lets through almost the same delivery as the delivery which is injected via the four nozzles 15, and, as a result, the level in the drums 1 and 2 remains practically unchanged.

25

The temperature of the water is raised as required by the resistors 20 in the reservoir or by means of steam injection.

30

As, during the washing, water is constantly pumped in a closed circuit through the inner drum 2 by the means 7, and thus also through the reservoir 8, all the water is finally heated.

It is possible to activate the high-pressure pump 9 only after the water in the drum 2 has reached the required temperature.

5 However, the water could also or partly be heated by means of for example resistors which are mounted at the bottom in the fixed outer drum 1, or also by means of heating means which are erected outside the actual washing machine, for example means for steam injection,
10 or by a combination of these possibilities with resistors in the reservoir 8.

The laundry in the inner drum 2 is not only washed in the conventional manner as a result of the mutual friction of
15 pieces of laundry, but moreover also thanks to an additional mechanical action, namely the action of water under high pressure on the laundry. Said water, which is injected through the nozzles 15, ends up on the laundry in motion through the openings 3 in the inner drum 2.

20 The embodiments according to figures 2 to 4 only differ from the above-described embodiment in that the nozzles 15 are not provided in the outer casing 1, but on other places, so that it is avoided that part of the injection
25 force is lost because the water jet collides with the inner drum 2.

In the embodiment according to figure 2, the nozzles 15 are mounted in the loading door 22 which closes off the
30 horizontal inner drum 1 on the front side. The sprinkler nozzles which form these nozzles 15 thus spurt directly in the inner drum 1 via the opening 23 in the front side of this inner drum.

Naturally, the nozzles 15 are situated above the water level 21 in the outer drum 1, whereas the conduits 14 connect onto these nozzles 15 via a flexible part so as to make it possible for the loading door to open.

5

In the embodiment according to figure 3, the nozzles 15 are provided in the backwall of the inner drum 2, so that it is also possible to spurt directly in the inner side of this inner drum 2.

10

The end of the conduit 14 which feeds the nozzles 15 is connected via a rotating coupling 24 onto a duct 25 which extends axially through the shaft 26 with which the inner drum 2 is bearing-mounted in relation to the outer drum 1 and which is connected to the nozzles 15 via ducts in or conduits 27 on the backwall of the inner drum 2.

The embodiment according to figure 4 only differs from the preceding embodiment in that the ducts or conduits 27 in the backwall of the inner drum 2 go through the ribs 19 and further axially up to the nozzles 15 which are provided in these ribs 19.

According to a variant of this embodiment, the ribs may be hollow, whereby the nozzles may be replaced by ordinary nozzles directly in the ribs, for example on an inwardly directed edge of these ribs.

According to all these embodiments, a significantly better washing result can be obtained in a simple and relatively cheap manner by injecting water under high pressure in the inner drum 2.

The present invention is by no means restricted to the

above-described embodiments as represented in the accompanying drawings; on the contrary, such a washing machine can be made in all sorts of variants while still remaining within the scope of the invention.

5

In particular, the washing machine does not necessarily need to contain an inner drum forming one compartment. This drum can be relatively long and can be divided in several compartments in the axial direction. Such washing machines, called washing streets, are mainly used in industrial laundries. The laundry is put in the washing machine at one end and is automatically moved from one compartment to the other and subjected to a washing or rinsing operation in each compartment.

15

Further, the drums can be suspended in any way whatsoever, namely on a hanging shaft, on a shaft provided at each end, etc.

20 According to the invention, such a washing street may be provided with means to inject water under high pressure in these compartments of the inner drum where a washing operation takes place.

Claims.

- 5 1. Washing machine containing a fixed outer drum (1), an
inner drum (2) mounted therein in a rotatable manner and
provided with openings (3), which is provided with ribs
(9) on the inside, means (4) to rotate the inner drum
(2), a water inlet (5) which opens in the outer drum (1),
10 and a water outlet (6) which is connected to the bottom
side of the outer drum (1), characterized in that it
contains means (7) to inject water under high pressure in
the inner drum (2).
- 15 2. Washing machine according to claim 1, characterized in
that the means (7) to inject water under pressure also
contain means (11-12) to evacuate water from the outer
drum (1) while water is being injected under high
pressure, in practically corresponding amounts.
- 20 3. Washing machine according to claim 2, characterized in
that the means (7) to inject water contain a closed
circuit in which is mounted a high-pressure pump (9).
- 25 4. Washing machine according to any of the preceding
claims, characterized in that the means (7) to inject
water contain one or several nozzles (15).
- 30 5. Washing machine according to any of the preceding
claims, characterized in that the nozzles (15) consist of
sprinkler nozzles.
6. Washing machine according to any of claims 4 or 5,
characterized in that the nozzles (15) are provided on

the outer drum (1).

7. Washing machine according to any of claims 4 or 5,
characterized in that the nozzles (15) are situated in
5 the loading door (22).

8. Washing machine according to any of claims 4 or 5,
characterized in that the nozzles (15) are situated in
the
10 backwall of the inner drum (2).

9. Washing machine according to any of claims 4 or 5,
characterized in that the inner drum (2) is provided with
ribs (19) and in that the nozzles (15) are situated in
15 the ribs (19).

10. Washing machine according to any of claims 8 or 9,
characterized in that the means (7) to inject water under
pressure contain a duct (25) in the shaft (26) with which
20 the inner drum (2) is mounted in a rotating manner in the
outer drum (1), a rotating coupling (24), a water conduit
(14) which is connected onto the rotating coupling (24)
and a conduit (27) which is connected onto one end of the
duct (25).

Fig. 1

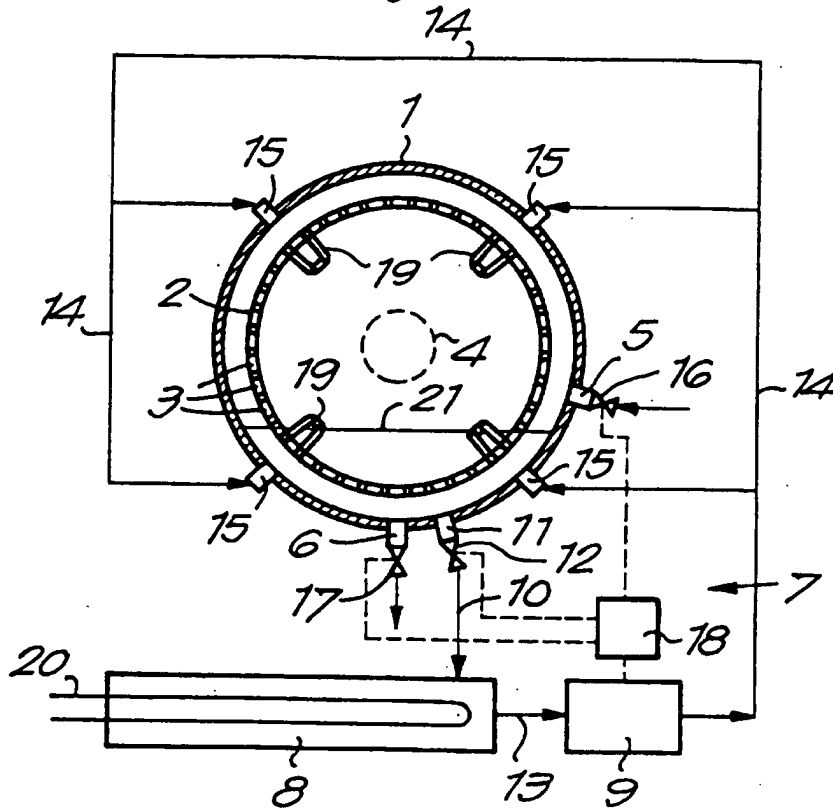


Fig. 2

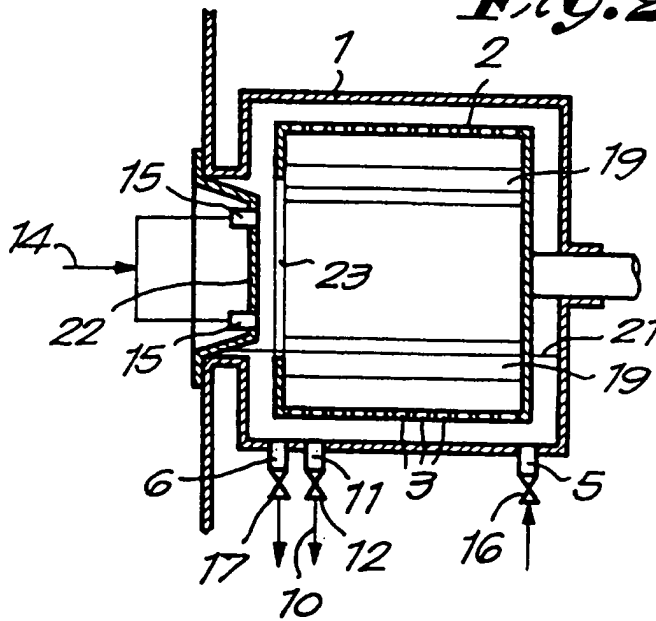


Fig. 3

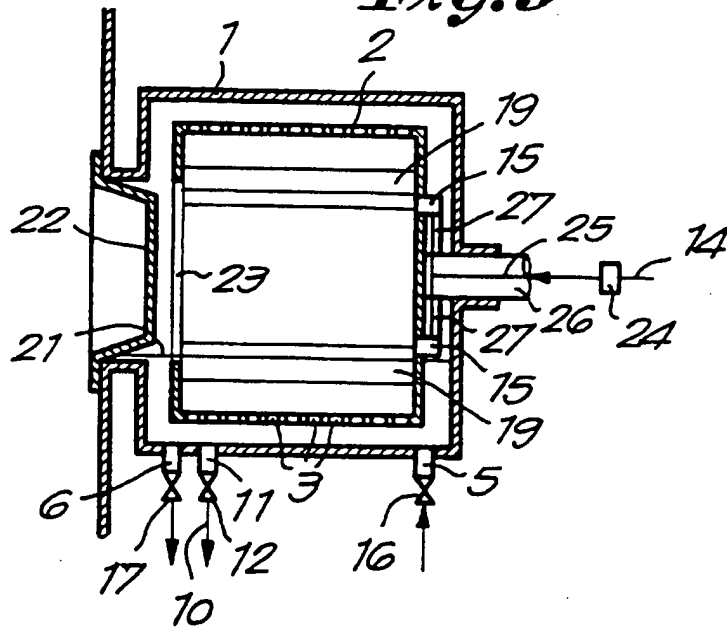
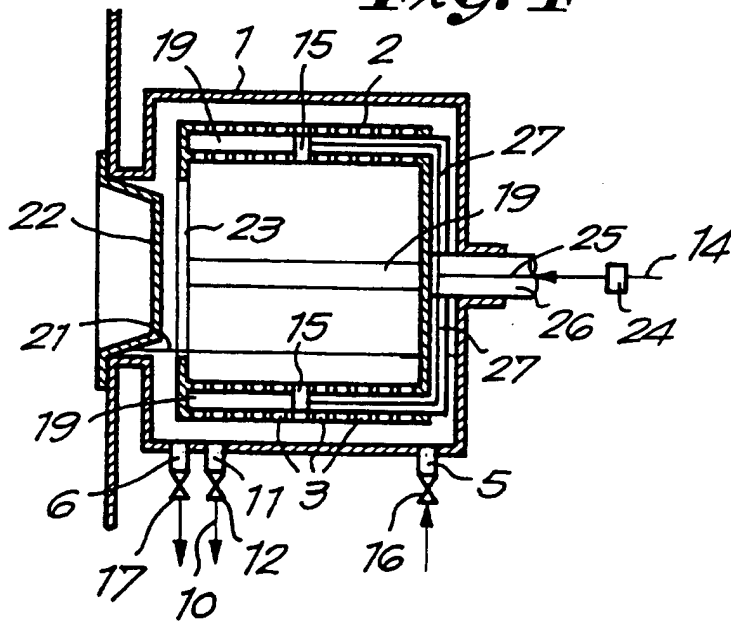


Fig. 4



INTERNATIONAL SEARCH REPORT

International Application No
PCI/BE 96/00110

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 D06F35/00 D06F39/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 6 D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE,A,42 36 873 (H. FALLER) 5 May 1994 see claims; figures ---	1-5,7
X	EP,A,0 146 719 (INDUSTRIE ZANUSSI S.P.A.) 3 July 1985 see page 6, line 29 - page 7, line 24; figures 1,2 ---	1-6,9,10
X	FR,A,2 525 645 (THOMSON-BRANDT) 28 October 1983 see claims; figures -----	1-8,10

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

A document defining the general state of the art which is not considered to be of particular relevance

E earlier document but published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

A document member of the same patent family

Date of the actual completion of the international search

28 January 1997

Date of mailing of the international search report

06.02.97

Name and mailing address of the ISA
 European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+ 31-70) 340-3016

Authorized officer

Courrier, G

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/BE 96/00110

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A-4236873	05-05-94	NONE	
EP-A-146719	03-07-85	DE-A- 3468453 US-A- 4580421	11-02-88 08-04-86
FR-A-2525645	28-10-83	NONE	